

ALTERNATIVE PATTERNS OF DECISION-MAKING IN EMERGENT DISASTER RESPONSE NETWORKS*

Thomas E. Drabek
University of Denver
Denver, Colorado 80208, USA

Data are presented which depict the pattern of decision-making in seven emergent multitiered organizational networks (EMONS). These EMONS were the emergency response systems through which most search and rescue (SAR) activities were accomplished in one remote area mission and six natural disaster settings, including the 1979 Wichita Falls tornado, Hurricane Frederic (1979), and the eruption of Mount St. Helens (1980). Discussion of results focussed on key structuring factors, i.e., why did these EMONS assume these particular shapes; performance implications; and policy implications. The major conclusion is that a new theoretical foundation for emergency management is required which is rooted in a locally focused perspective which reflects an imagery of loosely coupled systems whose degrees of interdependency undergo episodic, but very temporary, change.

Commenting on his visit to America in the early 1830s, De Tocqueville (1969) emphasized its tendency to organize. Almost as if Max Weber (1947) himself had been made king, however, subsequent maturation increased the presence of bureaucracy. Thus, Boulding (1968), Presthus (1962), Galbraith (1956), and others, documented the continuing trends of organizational births--and more importantly, rapid growth of many created earlier. In their minds, at least,

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America truly became an organizational society prior to the end of World War II.

Despite reservations of some--Riesman et al. (1950) and Whyte (1957) to mention but two of the early warning texts--this developmental pattern continued steadily. Desires for increased efficiency demanded it. So too did the consumer demands of most Americans. Be it in retail clothing or Saturday afternoon snacks, the principles of scientific management enjoy widespread application (Taylor, 1947). A shocking uniformity exists which is noticed especially when one travels in recently built sections of any American city. The same merchandise is welcomed by the same credit cards and identical food odors throughout similarly designed shopping malls.

The late sixties brought a bit more questioning (e.g., Roszak, 1968; Davis, 1971). It was short-lived, however, except in the dreams of the few who organized communes (Kanter, 1972). Today their continuance remains most problematic, however.

In all institutional areas, Taylor's principles of scientific management, modified by some with a dose of human relations (e.g., Mayo, 1933; McGregor, 1960; Likert, 1967), continue to structure the frame of reference of most American managers. Reflecting these elemental principles, today massive superstructures of people and machined are laced together through telephone lines linking CRT's into complex networks of management information processing systems.

Sensing the increased presence of these multilayered Goliaths, and perhaps a bit bored with endless correlation matrices of relationships among their internal structural characteristics--the problematical qualities of which remain hidden in the footnotes--scholars pursuing quite different research questions have explored them through inter-organizational analysis (e.g., Evan, 1972; Negandi, 1975; Mulford et al., 1979; Rogers and Whetten, 1979; Aldrich and Wetten, 1981; Rogers, Whetten et al., 1982). These studies have demonstrated that it is **systems of organizations** which process juvenile offenders (e.g., Hall et al., 1977), deliver medical services (e.g., White and Vlasak, 1970; McKeefery-Reynolds, 1980) and the like. Certainly, this focus also offers much in understanding community differences (e.g., Turk, 1970, 1973; Warren, 1967) and the political processes by which they are shaped (e.g., Laumann et al., 1978; Galaskiewicz, 1979). Certainly interorganizational relationships are easier to measure than vague notions of environment (Emery and Trist, 1965; Terreberry, 1968), despite the fact that such a quality appears to be a critical factor in understanding organizational birth (e.g., Stinchcombe, 1965; Hannan and Freeman, 1977) form (e.g., Aldrich, 1974; 1979; Aldrich and Pfeffer, 1976) and death (e.g., Langton, 1983). But aside from a few who seem to be marching at a different tune (e.g., Benson, 1975, 1977b; Zey-Ferrell and Aiken, 1981), the underlying imagery of Taylor and Weber still frame the questions --shape the lenses (Benson, 1977a).

Within this social and intellectual context, I embarked upon an

effort to map a type of system which heretofore has escaped the interests of others--emergent multiorganizational networks (EMONS) which respond to post-disaster search and rescue (SAR) demands. The experience has been enlightening. But I have become increasingly troubled with the thwarted expectations of many practitioners. Rather consistently, I have heard many emergency managers lament the quality of cross-agency communications and resulting coordination difficulties. Few, at the local level especially, seemed to grasp the complexity of the response system which emerged quite rapidly. And because they did not even grasp it, how could they expect to manage it? Yet, what I found even more troublesome was the model of management most were trying to use.

Organizational America is again witnessing voices of criticism from many sectors. Intellectuals like Scott and Hart (1979) question the fundamental values of the organizational imperative. Others, like Weick (1976, 1981) suggest that the images of tradition have precluded us from seeing the true nature of many systems, like schools. Despite the best efforts of many to invoke the wisdom of Taylor, these seem to persist as loosely coupled systems. Yet, most school managers, like those in other human service areas (e.g., Stein, 1981), are confronting intense pressures to demonstrate more precise accountability and improved efficiency (Katz, 1977). Excessive focus on these issues hides critical strengths inherent in more loosely coupled systems. Strengths like the capacity to respond to contradictory environments which Austin (1981) argues is an essential requisite for human service systems, as they have evolved in American communities. These are matters to which I want to return following discussion of the methods used and data produced through my mapping of a series of emergency responses.

Research Methodology

For about two years, (1978 to 1980), I monitored large scale natural disasters throughout the U.S.A. and identified several wherein the demand for search and rescue was most acute. With the help of a small field team, data were collected through interviews with managers of the responding organizations. Our intent was to prepare a set of case studies in which the multiorganizational responses could be documented (e.g., Drabek et al., 1981/82; Adams et al., 1980; Kilijaneck et al., 1979; Tamminga et al., 1979). As a point of contrast, we also selected one remote area SAR mission and examined the emergent growth of the response system (Drabek et al., 1979). Recently, we described the major features of each case and identified common operational problems, e.g., cross-agency communication, unplanned medial relationships (Drabek et al., 1982). In contrast, the analysis here is an in-depth treatment of one portion of those data and my reflections on their meaning.

Our methods varied slightly in each case study. The approach, data collection instruments, and procedures, had much in common, however. Following a short reconnaissance trip to establish the population of organizations most involved in meeting the SAR demands and to obtain agency cooperations, a series of structured interviews were conducted with at least one representative from each agency selected--typically the head. The initial trips occurred within a few days after the event. Follow-up interviewing occurred within one to two weeks thereafter. Additional data were collected through a short questionnaire which was left upon completing of the interview, thereby providing background information, e.g., organizational size, budget, formalization, etc., in a reasonably efficient manner. Throughout, we were guided by the imagery of the "stress-strain" theoretical perspective (Haas and Drabek, 1973; Drabek and Haas, 1974).

Seven SAR EMONS

Numerous events occurred which seemed to fit our research criteria--mainly an acute SAR demand requiring a sustained multiorganizational response. These responses--that is, emergent multiorganizational network or "EMONS"--became our units of analysis. Through brief telephone interviews with a few federal, state, and local managers, most events were eliminated rather quickly. Too often elaborate and daring rescue efforts were exaggerated by the media and responses were very short lived or were comprised of only two or three agencies. For the seven events selected, these preliminary inquiries also provided the opening liaison for follow-up contract.

The seven cases selected were:

1. Mount Si, Washington; May, 1978; remote area SAR mission, lost photographer (17 interviews).
2. Lake Pomona, Kansas; June, 1978; tornado striking the Showboat Whippoorwill (20 interviews).
3. Texas Hill Country; August, 1978; extensive flash flooding in Bandera, Kendall, and Kerr counties (14 interviews).
4. Wichita Falls, Texas; April, 1979; tornado (26 interviews).
5. Cheyenne, Wyoming; July, 1979; tornado (14 interviews).
6. Jackson County, Mississippi; September, 1979; Hurricane Frederic (23 interviews).
7. Mount St. Helens, Washington; May, 1980; Volcanic eruption with acute SAR demands in Cowlitz, Lewis, and Skamania counties (22 interviews).

No two disasters are identical, yet across various types of analytic criteria, certain parallels do exist (Barton, 1969; Dynes, 1970). Thus, four of these events were relatively focused geographically. The other three--Texas Hill Country flash floods; Hurricane Frederic's ravage of Jackson county; and Mount St. Helen's consequences for Cowlitz, Skamania, and Lewis County officials--impacted much larger areas. Indeed, all three affected numerous additional communities that we could have studied had resources permitted.

Of course, I intend no claim as to the representativeness of these seven cases from among the total population of such events (see Wright et al., 1979; Wright and Rossi, 1981). But given the near total absence of such comparative analysis, I believe that a great deal can be learned from this small, but rather diverse sample. For the fact is, never before had anyone tried to list the array of agencies that comprise such response systems, much less examine the dynamics of their emergent relationships.

The agencies that were most involved in responding to the SAR demands produced by the seven events are displayed in Tables 1 and 2. The diversity among the agencies that comprised each of these seven emergent response networks is substantial. Authority domains vary widely. The EMONS contain units of local government, state

Table 1: Components of Four Geographically Focused SAR EMONS

Task Type	SAR EMON Mount Si	Lake Pomona	Wichita Falls	Cheyenne
Law Enforcement	2	7	4	3
City/County	King County Police Skagit County Sheriff	Osage County Sheriff Osage County Attorney Burlington Police Lyndon Police	Wichita Falls Police Wichita County Sheriff	Cheyenne Police Laramie Co. Sheriff
State		Kansas Highway Patrol Kansas Parks & Resources Kansas Game and Fish	Texas Highway Patrol Texas Highway Patrol	Wyoming Highway Patrol
Civil Defense	1	1	2	2
City/County		Osage County CD	W.F. Risk Managem. CD Wichita County CD	Laramie Co.-Cheyenne CD Agency
State	Washington State Dept. of Emergency Services			Wyoming Disaster & CD Agency
Fire	0	2	4	3
City		Topeka Fire Rescue Carbondale Fire Dept.	Wichita Falls Fire Electra Fire Dept. Burk Burnett Fire Dept. Iowa Park Fire Dept.	Cheyenne Fire Laramie Co. Distr. 1 Laramie Co. Distr. 2
Medical	0	3	1	1
Ambulance		Crabbe Ambulance Franklin County Ambulance Osage County Coroner	Gold Cross Ambulance	A-1 Ambulance
Other				
Military	3	1	3	2
State	Wash. Army Nat. Guard Wash. Air Nat. Guard		Texas Nat. Guard	Wyoming Nat. Guard (Air & Army)
Federal	Ft. Lewis (Army Helicopter)	U.S. Army Reserve	Sheppard AF Base Ft. Sill (MAST)	Francis E. Warren AF Base (fire unit)
Volunteer	6	3	3	3
Disaster	Boeing Employees Am. Radio Society	Red Cross	Am. Radio Emergency Services - ARES Red Cross Am. Rescue Dog Assoc.	Red Cross Salvation Army Shy-Wy HAM Radio Club
SAR	Seattle Exp. SAR Tacoma-Pierce Exp. SAR 4 by 4 Rescue Council German Shepherd Search Dogs of Washington Seattle Mountain Rescue Council	Lee's Summit Underwater Rescue Shawnee County CD Underwater Rescue		
Other	1	3	3	0
City/County			Wichita Falls Traffic Wichita Falls Public Works Texas Highway Dept.	
State/ Federal/ Private	Boeing Corporate Helicopter	Kansas Dept. of Trans. U.S. Army Corps. of Engineers Topeka Radiator and Body		
Total	13	20	20	14

Table 2: Components of Three Geographically Diffuse SAR EMONS

Task Type	SAR EMON Texas Hill Country	Jackson County	Mount St. Helens
Law Enforcement	7	5	3
City/County	Kendall County Sheriff Kerr County Sheriff Bandera County Sheriff Kerrville Police Texas Highway Patrol (7) Texas Park and Wildlife (3) Texas Rangers	Jackson County Sheriff Pascagoula Police Ocean Springs Police Moss Point Police Mississippi Highway Patrol	Lewis County Sheriff Cowlitz County Sheriff Skamania County Sheriff
State			
Civil Defense	4	4	3
City/County	Kendall County CD Kerr County CD Bandera County CD Texas Div. of Disaster Emergency Services	Jackson Co. Disaster Ser. Ocean Springs CD Moss Point CD Mississippi State CD	Lewis County CD Cowlitz County CD
State			Washington State Dept. of Emergency Services
Fire	7	6	1
City/County	Kerrville Fire Dept.	Pascagoula Fire Dept. Ocean Springs Fire Dept. Moss Point Fire Dept. Gautier Vol. Fire Dept. Gulf Park Estates Vol. Fire Dept. Escatawpa Vol. Fire Dept.	Toledo Fire Dept.
State	Comfort Vol. Fire Dept. Centerpoint Vol. Fire Dept. Ingram Vol. Fire Dept. Kerrville (South) Vol. Fire Dept. Bandera Vol. Fire Dept. Pipe Creek Vol. Fire Dept.		
Medical	1	1	1
Ambulance		Amesbury Emergency Medical Services	
Other	Emergency Med. Serv. (2)		Cowlitz County Coroner
Military	2	2	9
State	Texas National Guard	Mississippi Nat. Guard (Co. B 890th ENG. BN) U.S. Coast Guard (Pascagoula Station)	Washington Army Nat. Guard Washington Air Nat. Guard U.S. Army 3rd-5th Cavalry 593rd Support Group 34th Medical Detachment U.S. Air Force 304th Air Rescue Group 303rd Air Rescue Group 6th Detachment, Air Control Wing U.S. Coast Guard
Federal	U.S. Army MAST (Ft. Sam Houston)		
Volunteer	3	3	6
Disaster	Red Cross (2) Salvation Army REACT (Kerrville)	Jackson County Rescue Units Red Cross Salvation Army	Red Cross Salvation Army
SAR			Civil Air Patrol - Washington Wing Salkum SAR Group Lewis County ESAR SAR Dog Association
Other	1	0	4
State	Texas Highway Dept. (2)		Washington State Aeronautics U.S. Forest Service Vancouver (Distr. Office) Packwood (Distr. Office) Randle (Distr. Office)
Federal			
Total	25	21	27

* Number in Parenthesis indicated formal interviews conducted with staff working in different locations, e.g., State Highway troopers in various field locations, communications center, and district offices. Two county EMS units were separate organizations but not differentiated systematically in interviews.

agencies, specialized federal resources, and various private and volunteer groups. If conceptualized as a system to be managed, the components clearly are loosely coupled in several of the alternative meanings of that term identified by Weick (1976:5). Yet, all were seeking to assist in a task with time requirements which were assumed to be acute.

The Mapping Process

The interviews conducted with the managers of the organizations responding to the SAR demands created by these events contained both open-ended and fixed choice responses. Following a few general questions regarding the role of their organizations during the response, they were given a list of the organizations we had selected for study. Using procedures similar to those reported by Hall et al. (1977), we proceeded to give them a series of cards on which separate questions and response categories appeared. Thus, they responded to a decision-making interview item within the context of having identified previously the frequency and mode of communication their organization had with each of the others on the list during this phase of the response. The response period was divided into four time segments for each case studied; this to permitted assessment of growth and stability. In this analysis, however, all data presented pertain only to the initial response period.

In an effort to map the structure of the pattern of decision-making among the responding agencies, the following interview item was used:

Thinking in terms of the major decisions affecting the overall search and rescue operation, rank in order the organizations that made the key decisions. If several were equally important, rank them equally; name your organization if appropriate.

As might be expected, a few managers responded with comments like--"No one organization really made the key decisions." They were urged to give several multiple rankings of a "1," if that seemed appropriate. A few indicated that such a ranking could not be done because the units responded on a totally autonomous basis, each doing some aspect of the job required. As they perceived it, some simply had completed "appropriate" tasks without much consultation with the others. A few other managers indicated that their personnel worked in somewhat isolated locations where others had not participated. But aside from a geographical or functional division of labor, these managers insisted that no one was directing the overall response. With this noted, no rankings were listed, and the interview proceeded.

These types of responses were given by only a few managers, however. Most could give several rankings rather easily. Obviously, numerous criteria might have been used by different managers in making the rankings they gave us. And there are the equally obvious issues of relative weightings when such responses are aggregated.

Given the absence of past efforts to explore such lived activity systems, however, this type of mapping strategy seemed worth exploration.

To reduce one form of bias, all rankings given for their own organization were deleted. Then, the various rankings given by every manager for all of the other organizations in the EMON were combined by simple addition, with a ranking of 1 assigned a 6, a 2 assigned a 5, and so on. This sum was then divided by the total number of managers giving rankings, regardless of whether or not they gave a rank to any particular organization. Thus, while crude, I believe that this mapping process provides a reasonably valid procedure for identifying those agencies *perceived* to be more influential in making decisions affecting the overall system during the response period.

Results

Let us focus first on the rankings obtained among the component agencies in the four geographically focused events. These are listed in Table 3. Note that in the Mount Si response, the King County Police were perceived by the other managers as being the top ranking

Table 3: Decision-Making Structure of Four Geographically Focused SAR EMONS

ORG. Rankings	SAR EMON		Lake Pomona		Wichita Falls		Cheyenne	
	Mount Si Org. Name	DMSS	Org. Name	DMSS	Org. Name	DMSS	Org. Name	DMSS
1	King Co. Police	60	O.C. Sheriff	52	W.F. Police	31	L.C.-Ch. CD	52
2	SESAR	41	K. High. Patrol	45	T. High. Patrol	24	C. Police	25
3	W X 4	27	K.S. Parks	26	W.F. CD	17	L.C. Sheriff	17
4	GSS Dogs	13	K.S. Game-Fish	20	W. County CD	16	Wyo. CD	15
5	Boeing H.	7	Army Corps Eng.	13	W.C. Sheriff	11	C. Fire	12
6	Wash. S. DES	7	O.C. CD	10	W.F. Fire	10	Wyo. Nat. Guard	7
7	Wash. NG (Air)	7	O.C. Coroner	7	T. Nat. Guard	9	Warren AF Base	5
8	BEARS	0	Crable Am.	3	W.F. Traffic	7	L.C. Fire 1	3
9	Skagit C. Sheriff	NP	Franklin Co. Am.	3	W.F. Public Works	7	L.C. Fire 2	3
10	T-P ESAR	NP	O.C. Attorney	2	Sheppard AF Base	6	A-1 Am.	2
11	Seattle MRC	NP	Shawnee Co. UR	2	Gold Cross Am.	4	Wyo. High. Patrol	0
12	Ft. Lewis	NP	K.S. Trans.	0	T.S. Parks	4	Red Cross	0
13	Wash. NG (Army)	NP	Army Res.	0	Vol. Fire 1	4	Salvation Army	0
14			Lee's S. UR	0	Vol. Fire 2	4	Am. Radio (Shy-Wy)	0
15			Burlingame Police	0	Am. Radio (PRES)	1		
16			Lyndon Police	0	Red Cross	1		
17			Red Cross	0	T.S. Highway	0		
18			Topeka Fire R.	0	Am. Rescue Dog	NP		
19			Carbondale Fire	0	Vol. Fire 3	NP		
20			Topeka R. and B.	0	Ft. Sill MAST	NP		

* Interview item: "Thinking in terms of the major decisions affecting the overall search and rescue operation, rank in order the organizations that made the key decisions. If several were equally important, rank them equally; name your organization if appropriate." All ranks given for own organization were deleted (see text). Ranks of 1 were scored as 6, 2's scored as 5, and so on. The DMSS was calculated by summing all weighted ranks; dividing by the number of responses possible; and multiplying by 10. All DMSS scores listed are for the initial response period, typically the first 6 hours after impact or mobilization. Some organizations were not present until later in response (NP).

organization in terms of making key decisions for the overall operation. This was a routine mission. A four day search was conducted for a single individual. All participating managers agreed; there was no issue about who would call the shots.

So too, a law enforcement agency--the County Sheriff--headed the Lake Pomona response. But in Cheyenne, the local civil defense unit emerged as the one ranked most frequently, although the city police scored highly too. These three response sets contrast sharply to Wichita Falls, however. Here, no one agency commanded a clear designation across the total set of 17 managers. Domain consensus was relatively low.

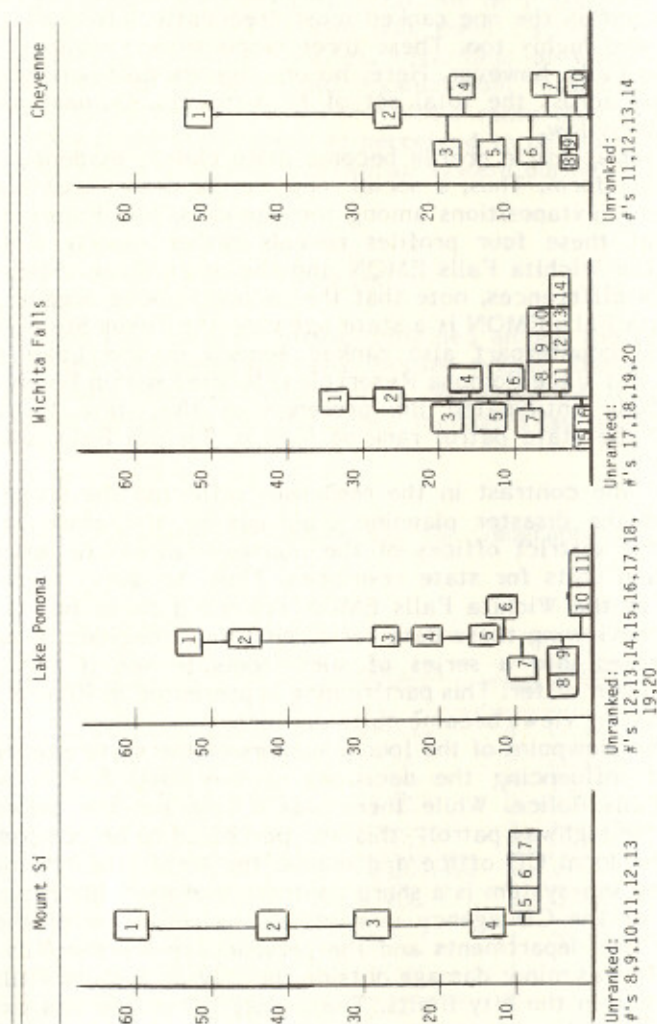
These variations in profile become more clearly evident when put into graphic form. Thus, a social map can be drawn that highlights the relative juxtapositions among the agencies. See Figure 1. Comparisons of these four profiles reveals rather clearly a contrast between the Wichita Falls EMON and the other three. Also, beyond the profile differences, note that the second ranking organization in the Wichita Falls EMON is a state agency--the Texas State Highway Patrol. Its counterpart also ranked second in the Lake Pomona response. But since Pomona Reservoir is located within Pomona State Park, I fully anticipated the presence of the State Patrol. But why would the state patrol rank so high in Wichita Falls and not in Cheyenne?

In part, the contrast in the responses reflected the scope of the event and the disaster planning emphasis by the state of Texas wherein the district offices of the highway patrol are designed as coordination units for state resources. Thus, to some degree their visibility in the Wichita Falls EMON reflected these two qualities. But after reviewing these data for some time, I decided to partition the responses into a series of subsystems to see if the profiles obtained might differ. This partitioning is presented in Figure 2. Here the contrasting views became quite distinct.

From the viewpoint of the four managers of the state agencies, the unit most influencing the decisions of the total EMON was the Wichita Falls Police. While there was a role for the prime state agency--the highway patrol--this was perceived to be comparable to that of the local CD office and maybe the local public works unit. The county sub-system is a sharp contrast, and basically reflects the direction of the CD agency in coordinating responses of the three volunteer fire departments and the personnel in the sheriff's office. While there was minor damage outside the city of Wichita Falls, most occurred within the city limits. The county CD office was viewed as the link to the city response system.

In contrast to these two views, note the city view presented in Figure 2. Here, the aggregated responses indicated a perception of marked influence by the state patrol. While the local CD office and the city police and fire agencies were ranked rather highly, none commanded top ratings by most of the other managers.

FIGURE 1
SOCIAL MAPS OF THE DECISION-MAKING STRUCTURES IN FOUR GEOGRAPHICALLY FOCUSED SAR EMONS*



*See Table 3 for the organizational names corresponding to the numbers listed above, e.g., Organization #1 for Mount Si is the King County Police and for Lake Pomona, Organization #1 is the Osage County Sheriff's Department.

But the massive destruction of the Wichita Falls tornado left these agencies with minimal means of communication. Thus, the perceived relative influence of any one agency over the others was hampered greatly. While focused geographically, these data suggest the presence of at least three sub-systems within the overall response system. And among the city agencies, the initial response period appears to have been one wherein the relative influence in decision-making among the units were perceived differently.

Aggregated scores of each of the three EMONS across the more diffuse demand sets are presented in Table 4. The relative rankings are somewhat instructive once again. Among the 25 agencies responding to the flash flooding across portions of the three Texas counties, note that only one received a score above 30--and the state patrol did so, just barely. But the patterning parallels that seen in the other response sets. That is, the three sheriffs and the three local CD agencies rank at the top; along with the state CD agency and the National Guard. Yet all scores are relatively low, suggesting potential differences in view.

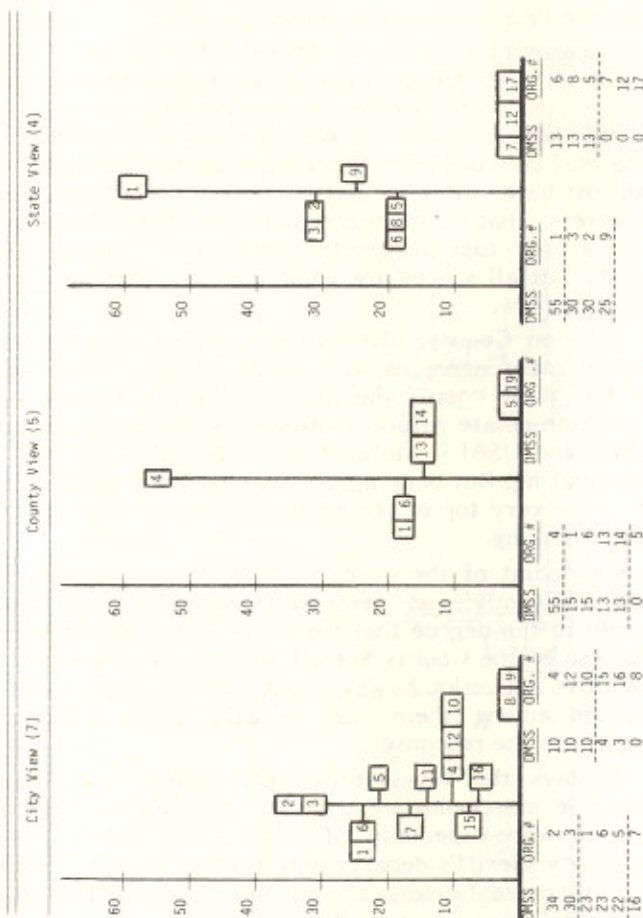
So too in Jackson County, although once again civil defense and local law enforcement agencies were ranked higher than the other participants. The three county sheriffs, and the two federal agencies which provided immediate resources following the Mount St. Helens eruption--USFS and USAF--captured the top ranking among the 18 agencies participating. But once again, none secured enough rankings to put them at the very top of the scale. The contrast to Mount Si or Lake Pomona is striking.

From the standpoint of the overall EMON then, I suggest that no single agency uniformly was perceived as influencing the total response system to the degree that the King County Police was in the Mount Si response or the County Sheriff was at Lake Pomona. Within these more diffuse networks, however, sub-systems can be identified. But the profiles among them vary greatly; again indicating an important quality in the responses.

Figure 3 displays the sub-system views within the Texas Hill County. From the standpoint of the six state and federal agency heads, three units were especially influential--the state patrol, state CD, and one county sheriff's department. Turning to Bandera County, however, a sharp contrast emerges. Here two volunteer fire units, the emergency medical service, and the local CD agency, are given higher rankings than the sheriff's department. Thus, the perceptions of the state managers were not shared by those directing local agencies within this county.

In Kendall County, the sheriff and the local CD director were each perceived as being quite influential, both obtaining rankings of 50. But in Kerr County, although not to the extent as Bandera, a truncated profile also emerged. At the top, however, were the Sheriff's Department and the local CD office.

FIGURE 2
SUB-SYSTEM VIEWS OF THE DECISION-MAKING STRUCTURE IN THE NICHITA FALLS SAR EMON*



*Procedures paralleling those used for Table 3 were used, except that the rankings given by the three categories of managers were partitioned. "City View" displays the ranking offered by the 7 managers of organizations within the city of Nichita Falls vs. the 5 county based units vs. the 4 state agencies. ORG. # is the ranking listed in Table 3, e.g., ORG. #2 is Texas Highway Patrol.

These mixtures in views are sharply contrasting to those obtained in Jackson County, Mississippi. Here the various subsystems reflect substantial ordering with lead agencies identified in a consistent manner. Thus, while the image produced by an aggregation of the agencies suggested a lack of clarity, the orderings within the four sub-systems indicate rather clearly defined structures. At these sub-system levels there was high consensus.

The Mount St. Helens response, suggests this interpretation too, although less distinctly. Thus, among the two managers at the external emergency operations centers--the initial federal response was based at the USFS office in Vancouver and the state resources were coordinated through the Department of Emergency Services' Emergency Operations Center (EDC) in Olympia--the three county sheriffs were viewed as the three key decision units. Within Cowlitz and Skamania counties, which worked out of the Toutle area, a less

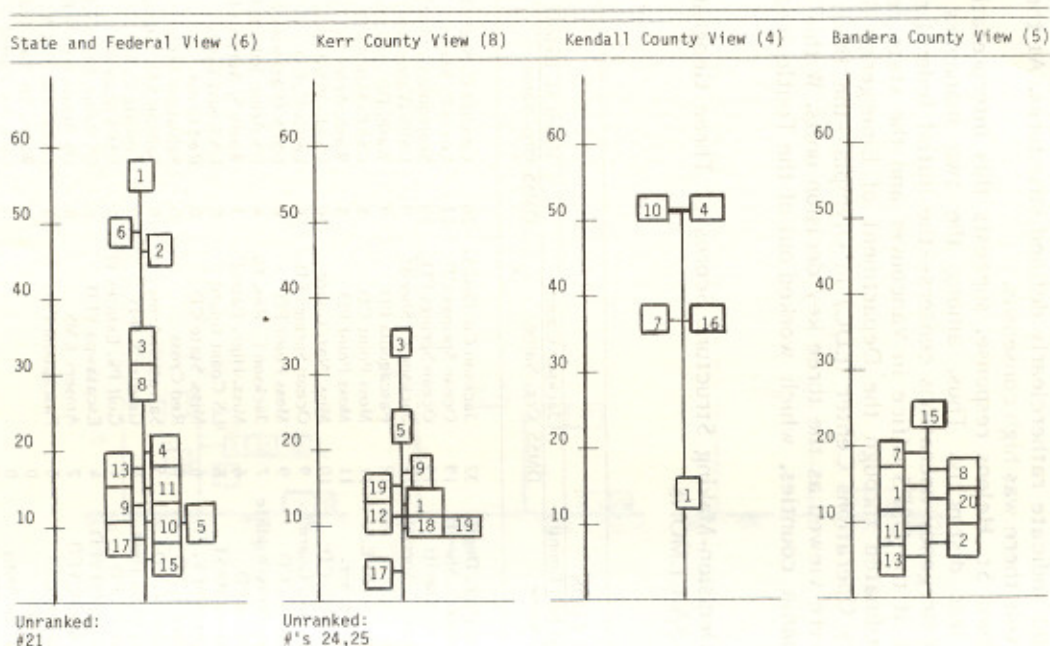
Table 4: Decision-Making Structure Scores of Three Geographically Diffuse SAR EMONS

ORG. Rank-ings	Texas Hill Country		Jackson County		Mount St. Helens	
	Org. Name	DMSS	Org. Name	DMSS	Org. Name	DMSS
1	Texas High. Dept.	32	Jackson Co. Dis. S.	26	Cowlitz C. Sheriff	41
2	Bandera C. Sheriff	19	Ocean Springs CD	11	Lewis C. Sheriff	23
3	Kerr C. Sheriff	19	Ocean Springs PD	10	Skamania C. Sheriff	15
4	Kendall C. Sheriff	14	Jackson C. Sheriff	9	USFS (Vancouver)	12
5	Kerr C. CD	12	Pascagoula PD	9	Wash. Div. of E.S.	12
6	Texas Div. of E.S.	11	Moss Point CD	8	USAF-34th ARG	11
7	Em. Med. Ser.	11	Moss Point PD	8	Wash. Army NG	11
8	Bandera C. CD	10	Miss. Nat. Guard	6	USAF-303rd ARG	9
9	Texas Nat. Guard	9	Ocean Springs FD	6	Lewis C. CD	5
10	Kendall C. CD	9	Moss Point FD	6	USFS (Packwood)	5
11	Texas Parks-Wildlife	7	Jackson C. Res. U.	4	US Army 3rd-5th Cal.	2
12	Kerrville PD	6	Miss. High. Patrol	3	Wash. S. Aeronautics	2
13	US Army MAST	6	US Coast Guard	0	US Coast Guard	0
14	Centerpoint V. FD	6	Miss. State CD	0	Red Cross	0
15	Bandera V. FD	6	Red Cross	0	Salvation Army	0
16	Comfort V. FD	5	Salvation Army	0	Salkum SAR Group	0
17	Texas High. Dept.	4	Gautier V. FD	0	Cowlitz C. CD	0
18	Ingram V. FD	4	Gulf Pk. Estates VFD	0	USFS (Randle)	0
19	Kerrville (S) VFD	4	Escatawpa VFD	0	US Army-393rd S.G.	NP*
20	Pipe Creek VFD	2	Amserv EMS	0	US Army-34th M.D.	NP
21	Texas Rangers	0	Pascagoula PD	0	USAR-602 TACW	NP
22	Red Cross	0			Wash. Air Nat. Guard	NP
23	Salvation Army	0			Civil Air Patrol	NP
24	Kerrville FD	0			Lewis C. ESAR	NP
25	REACT (Kerrville)	0			SAR Dog Assoc.	NP
26					Cowlitz C. Coroner	NP
27					Toledo Fire Dept.	NP

* NP = not present during the immediate response period.

FIGURE 3

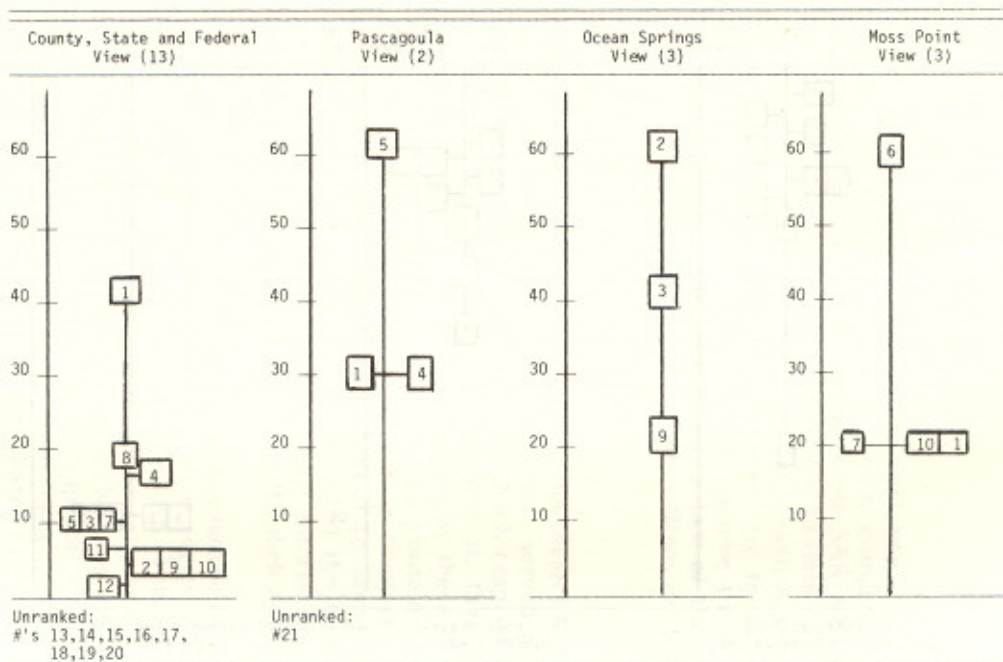
SUB-SYSTEM VIEWS OF THE DECISION-MAKING STRUCTURE OF THE TEXAS HILL COUNTRY SAR EMON*



*Procedures paralleled those used in Figure 2. Number in parenthesis is the total number of managerial rankings included in the sub-system, e.g., state and federal view represents the aggregation of responses of the six managers from those agencies.

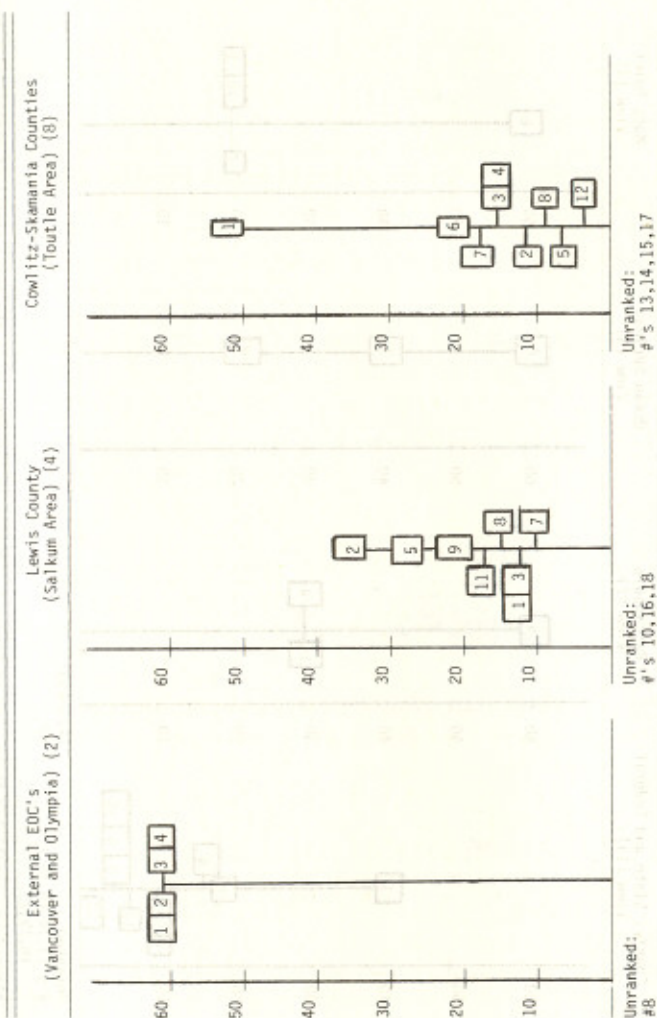
FIGURE 4

SUB-SYSTEM VIEWS OF THE DECISION-MAKING STRUCTURE OF THE JACKSON COUNTY SAR EMON*



*Procedures paralleled those used in Figure 2. Number in parenthesis is the total number of managerial rankings included in the sub-system, e.g., county, state, and federal view represents the aggregation of responses of the 13 managers from those agencies.

FIGURE 5
SUB-SYSTEM VIEWS OF THE DECISION-MAKING STRUCTURE OF THE MOUNT ST. HELENS SAR EMON*



*Procedures paralleled those used in Figure 2. Number in parenthesis is the total number of managerial rankings included in the sub-system, e.g., emergency operations centers (EOCs) were established in Vancouver by the USFS and in Olympia by the Washington State Department of Emergency Services.

clear image was forthcoming, although the Cowlitz County Sheriff's Department was most influential. But apparently, many there saw the USAF Air Rescue Group (304th) and the USFS office as playing key roles too, along with the Skamania County Sheriff. In Lewis County, the Sheriff's Department was again seen as the key agency, but the State DES office was also viewed as central.

Discussion

To my knowledge, these social maps depicting the managerial perceptions of the relative influence which component agencies played in decisions affecting seven large-scale SAR responses, provide the most detailed descriptions available to date (see Mileti et al., 1975; Quarantelli, 1978; Wenger and Parr, 1969). After reflecting on their composition and variation, however, my thoughts became focused on three questions: 1) Why did they assume their respective shapes? 2) What are the performance implications of these contrasting profiles? and 3) What broad policy implications do they suggest for emergency managers?

Structuring factors

Reviewing the case materials on each of the seven EMONS led me to conclude that five different types of factors served to constrain the actions of these managers. Thus, while each responded to meet the specifics of the challenge as they perceived it, their degrees of freedom were limited, at least to some degree, by these structures of constraint. Even non-routinized response sets contain elements of patterning, although far less predictability than many organizational processes which reflect tighter constraints. To some degree of course, identification of these factors reflected the mind-set from which I began collecting and interpreting the information obtained, i.e., the stress-strain theoretical perspective (Drabek and Haas, 1974; Haas and Drabek, 1973).

First, there are important differences in the **nature of the demand set** which they confronted. At Mount Si, all energies were directed toward a single individual thought to be lost. This is a striking contrast to the extensive and complex demand set produced by Texas Hill Country flooding or Hurricane Frederic. Not just the quantity or magnitude varied, however. So did the geographical scope and degree of forewarning. Frederic's path was plotted many hours ahead of its arrival. Residents in Bandera awoke with water racing through their bedrooms. Thus, the SAR demand set varied across several dimensions.

Second, as the Wichita Falls case illustrated so well, some events modify the **capacity to respond**. Temporarily without telephones and electrical power, agencies within Wichita Falls were hampered

acutely just when they needed their communication capability the most. Perceptions of relative influence in decision-making reflected this factor both in making managers less aware of what others were doing and in complicating their coordination efforts.

Third, though the personnel of all the organizations studied may be constrained by **normative guidelines** specifying appropriate modes of conduct, equivalent notions for these EMONS varied considerably. In Mount Si, preplanning had been intense and the demand set pretty much corresponded to what had been anticipated. Note the aggregation of ratings listed in Table 5 indicating that 98 percent of the ratings given by managers for each of the other organizations were in the top category. This contrasts sharply to the listing from Mount St. Helens, for example. Thus, while most local areas in Washington state are ready to search for a lost hiker, the Mount St. Helens eruption was beyond anything they had anticipated.

So too, through the memories of Camille, and others before her,

Table 5: Managerial Perceptions of Agency Preparedness Levels*

SAR EMON	Rating (Percent of Total)			
	Very Ready	Somewhat Ready	Slightly Ready	Not Ready
Mount Si (261 ratings)	98	2	0	0
Lake Pomona (148 ratings)	74	18	4	4
Wichita Falls (178 ratings)	63	33	4	0
Cheyenne (90 ratings)	72	14	12	1
Texas Hill Country (192 ratings)	55	26	17	3
Jackson County (117 ratings)	85	13	3	0
Mount St. Helens (124 ratings)	35	48	9	9

* Interview item: "Based on the knowledge that you might have regarding the activities of different organizations, how **ready** would you say each organization was to meet the search and rescue demands placed upon it?"

the managers of emergency agencies in Jackson County regarded each other as "very ready." Where multiagency planning had taken place which anticipated the demand set which was forthcoming, normative guides structured much of the managerial responses. To the degree that it was lacking, or did not fit the demands produced by the event, responses were more improvised. But even in Jackson County and the Mount Si mission--where designed planning best matched the demand set--unanticipated happenings required various improvisations.

Fourth, though the point was not explored systematically in our interviewing, there were numerous hints that **interpersonal linkages** among the sets of managers further guided their responses, especially perhaps their relative rankings regarding influence on decisions. In the absence of any perceived normative guideline, for example, the Sheriff emerged to direct the Whippoorwill response at Lake Pomona. Despite the fact that this tragedy occurred at a federal reservoir located within a state park, the interpersonal relationships dictated the sheriff as the most logical choice.

And finally, certain **resources** pushed some agencies into the forefront. Most critical here were emergency operations centers and the communications capability they represented. The respective civil defense units, both at the local and state levels, reflected this--even in Wichita Falls where the communication capability was temporarily rendered inoperable. To a large degree, the sub-system structuring within the overall EMONS reflected linkage patterns across the various EOC's. The Jackson County response illustrated this the most clearly. But so too does the state patrol's influence in the two Texas cases. Ideally, I suppose, EOC's should function as windows for extra-system resources.

In short, all seven responses emerged reflecting numerous acts of improvisation within sets of normatively prescribed guidelines which varied greatly in their completeness and in their fit with the needs generated. Recent rehearsals among those responding at Mount Si and Wichita Falls bore heavily in structuring the actions of many. But all responses were emergent, multiorganizational, and comprised of a diverse mixture of agencies with authority bases that are linked together very loosely--if at all.

Performance implications

What do these seven cases and the numerous social maps suggest regarding performance outcomes? Three very different types of messages seem implied. First, paralleling the data set presented in Table 5 (preparedness), managers were asked to rate all the other organizations about which they had first hand knowledge as to their response effectiveness. Using a similar format, we obtained estimates of conflict frequency and the degree of perceived coordination. All of these ratings apply only to the initial response

period. Aggregation of the perceptions obtained is displayed in Table 6.

As might be anticipated from the analysis thus far, the Mount Si response was characterized by a near absence of conflict and a general perception of high coordination. Most (85 percent) of the effectiveness ratings given were in the top category. Though not marked by large amounts of conflict, the two Texas responses were viewed by the participating managers as being less well coordinated. In the Hill Country, this undoubtedly reflected the lesser amount of preplanning that had occurred in these three counties for a flash flood of this magnitude. In Wichita Falls, by contrast, the tornado's destruction of electrical power and telephone lines hampered communications, which in turn made coordination far more difficult. This too is reflected in the managerial perceptions reported (see Table 6).

As I waded through these case materials, however, the concept of network effectiveness became increasingly problematic, especially for systems like these (see Jennergren, 1981:52-53; Scott, 1981:317-336). Gradually, I began to see an important parallel to studies of

Tabell 6: Managerial Perceptions of Agency Performance Qualities*

Performance Dimensions	Rating Categories (Percent of Total)			
	None	Some	Quite a Lot	Great Deal
Conflict Frequency				
1. Mount Si (226)	99	1	0	0
2. Lake Pomona (145)	89	9	1	1
3. Wichita Falls (151)	99	1	0	0
4. Cheyenne (104)	95	5	0	0
5. Texas Hill Country (191)	96	3	0	1
6. Jackson County (116)	98	2	0	0
7. Mount St. Helens (124)	83	13	3	0
Coordination Ratings				
1. Mount Si (231)	90	10	0	0
2. Lake Pomona (139)	71	14	9	6
3. Wichita Falls (148)	66	28	21	5
4. Cheyenne (86)	64	24	8	3
5. Texas Hill Country (237)**	33	24	16	25
6. Jackson County (116)	69	17	9	5
7. Mount St. Helens (129)	60	25	12	3
Effectiveness Ratings				
1. Mount Si (267)	85	13	0	0
2. Lake Pomona (147)	78	15	6	1
3. Wichita Falls (155)	91	3	5	1
4. Cheyenne (101)	96	22	20	2
5. Texas Hill Country (204)	73	22	5	1
6. Jackson County (115)	73	6	10	1
7. Mount St. Helens (120)	66	20	9	5

* All ratings given for own organization were deleted. Ratings listed refer only to the initial response period. In general, as the responses continued the number of ratings given increased slightly and became somewhat more positive. Interview items were: "During this period, how much disagreement was there in general between your organization and each of the other organizations?" "How well coordinated were the search and rescue activities of your organization and those of the other organization? (meaning that different organizations worked together in an organized and integrated way)" "How well did each organization perform its search and rescue-related task during this period (include your organization)?"

** Coordination ratings in the Texas Hill Country response were coded differently. When contact with an organization was indicated, but no coordination rating given, then a 4 (Not Coordinated) was assigned. This inflated the number of 4's assigned relative to the other cases. Once done, it was not possible to disaggregate.

schooling. Certainly there are many administrators, rooted in imag-eries of cost-effective models, who seek to prescribe school designs based on selected measures of student performance. Yet, any good teacher knows that these crudely assessed qualities are but one aspect of the desired impact. Perhaps designs that maximize the develop-ment of skills that are most easily measured, do so at the expense of other developments which are equally desired. Thus, those who might treasure the benefits of more standardized curricula, regimented teacher training, and the like--all the tools of managerial theory that have been applied so widely throughout all institutional sectors of American society--should be urged to consider the possibility that more loosely coupled systems, reflecting high teacher autonomy and control, might produce more desired educational outcomes (Weick, 1976).

Such conjecture takes us far beyond implications for performance of this sample of seven EMONS. It really introduces a set of ideas that pertain to a general theory of emergency management. Thus, this research experience led me to four conclusions about emergency response network effectiveness: 1) most managers really did not grasp the composition or diversity of the collection of agencies that would comprise such response networks; 2) it is the entire network that must be managed, by usually is not; 3) the few who do sense this managerial task are trying to apply the traditional tools of Taylor and Weber since that is what they have been taught; and 4) the very essence of the highly decentralized structure of American society mandates an alternative theory of emergency management which is more consistent with the actual ongoing political realities reflected in such locally based response systems.

Policy implications

Holding on this line of reasoning for just a bit, let us step back from the seven cases and note several important qualities.

- * Multiorganizational--event exceeded the capabilities of local agencies. Thus, specialized resources and assistance of many kinds were required from outside the local community.
- * Unit Diversity--these response systems were comprised of a diverse array of agencies.
- * Loose Couplings--the bases of authority, and the linkage mechanisms whereby these units might be integrated, varied considerably.
- * Emergence--none of these multiagency SAR response systems existed prior to the events studied; each grew over time, requiring differing amounts of improvisation that reflected unique qualities of the demand sets.
- * Local Control--all seven cases revealed varying involvement by state and federal agencies who supplied critical specialized

resources, but every SAR EMON remained under the control of local authority.

Despite the management authority of the US Forest Service in the Mount St. Helens area, the primary SAR responsibilities still fell to the three local sheriffs. So too at Lake Pomona, despite its enclosure within a state park boundary. Yet, the skill and preparation of the local managers to direct such response systems were woefully lacking, except in the Mount Si case--the simplest and most routine of the study sample. Never before had most of these local managers confronted a managerial problem of this complexity.

But so what? What is the fundamental insight? From my view it is this. Emergency management requires a theoretical foundation which is rooted in a locally focused perspective. Rather than trying to forge new constraints designed to obtain more standardized responses--in the name of effectiveness--we should seek to maximize the strengths inherent in localized response systems. For within such systems, managers sense greater degrees of autonomy and control over their personnel and agency focus.

When relatively infrequent, such as these cases exemplify for the affected communities, short lived multiunit response systems will be forthcoming. But they need not be standardized or uniformly designed. Rather, akin to the multiunit response to the Mount Si mission, they should be multiunit--comprised of a diverse array--and tightly coordinated during the response period. The planning required begins with the recognition that there is a sharp change in the degree and types of interdependence (see Pennings, 1981:434) among such units following events like these.

What is most lacking today is the specification of managerial strategies for directing these types of loosely coupled systems under varied conditions. How can the integrity of each respective unit be bolstered and promoted? How can the emergence of multiunit networks be facilitated so that the response best matches the specific--but variable and largely unpredictable--demand requirements?

Failing to grasp this imagery, wherein control and commitment can remain attached to smaller localized units, emergency management seems to be drifting into the same models of standardization which many are seeking to apply in other human service areas. In the name of "quality," standardization of curricula, training, and facilities, has removed more and more control from local units, be they school systems or hospitals. Throughout many institutional sectors within American society, this drift is revealed ever more frequently in the inherent clash in perspectives experienced by professionals trapped within overly rigid bureaucratic structures (e.g., Sorensen and Sorensen, 1974; Morrissey and Gillespie, 1975). Far too often, new physical resources which may dazzle the eyes are accompanied with increased rule constraint which in turn promotes a further sense of

powerlessness and dampened commitment among those responsible for management.

The vitality of response and intensity of commitment--both to their local unit and the search task at hand--observed among the Mount Si managers was at the opposite pole from that evidenced by administrators locked into overly regulated bureaucratic structures. Though their technical expertise differed sharply in content, the Mount Si rescuers displayed as much professionalism as most school teachers.

In my judgment, what is needed nationally is a priority on the design and implementation of training efforts for local managers so as to enhance their capacity to direct the types of systems documented above. This training should increase their skill in improvisation and in guiding the rapid responsive growth of multiunit systems that are capable of adapting to the varied demand requirements of highly episodic events. This is a sharp contrast to the prevailing planning emphasis that is all too reflective of scientific management. This imagery--modified little from Taylor's initial formulations--fails to recognize the potential strengths in loosely coupled systems that enhance swift improvisation, localized adaptation and novel solution. It is clear that the techniques for such skill development and system intervention await conceptualization although some leads are available (e.g., Cummings, 1980). It is also clear--as Aldrich (1978) has specified--that elements of both centralization and loose coupling are required. But the need for a more centralized decision-making system among such diverse sets of agencies is highly episodic and quite short lived.

In short, this excursion has led me to conclude that an alternative theory of emergency management is required. Such a theory must be rooted in the basic premise that the systems requiring management are loosely coupled and ought to remain so, for good reasons.

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